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POPULATION DYNAMICS OF KEY RAPTORS NESTING IN THE KEVIN RIM AREA

Challenge Cost Share Progress Report 1996 to
Bureau of Land Management
Great Falls District
80 Airport Road
Lewistown MT 59457

By

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INTRODUCTION

The Kevin Rim in northern Toole County Montana provides important habitat for a variety of raptors (Dubois 1988). Because of exceptionally high nesting density, the Bureau of Land Management has designated the Kevin Rim a "Key Raptor Area" and "Area of Critical Environmental Concern" (Williams and Campbell 1988). Of additional significance is that the nesting population includes 3 high profile (key) species; ferruginous hawks (*Buteo regalis*), prairie falcons (*Falco mexicanus*), and golden eagles (*Aquila chrysaetos*).

Despite a "not warranted" decision by the U.S. Fish & Wildlife Service to a petition for listing ferruginous hawks as threatened under provisions of the Endangered Species Act of 1973, knowledgeable biologists throughout North America continue to be concerned about dwindling numbers, loss of habitat, increasing frequency of years of poor reproduction, and absence of pairs at historical breeding sites. Recently, loss of habitat and mortality in wintering areas have been suspected as contributing to population declines but no data exist to confirm or reject this hypothesis or quantify the extent. Banding large numbers of ferruginous hawks each year may contribute significantly to understanding these problems.

Prairie falcons are considered uncommon throughout their range and, being obligate cliff nesters, loss of habitat is increasing from over development and over population by humans in suitable habitat in the West. Production of falcons at Kevin Rim may become more important for maintaining regional populations. At least one recently fledged, banded prairie falcon was electrocuted in southern Alberta in 1991. Since the late 1970s, golden eagle population status has largely been ignored. Golden eagle productivity may be decreasing and mortality increasing. Golden eagle reproduction was very low in Montana, Colorado, and Idaho in the early 1990's (Craig, J., Colo. Div. Wildl., pers. comm.; Vekasy, M., GreenFalk, Inc., pers. comm.; Harmata pers. obs.). Apparently the trend is continuing through the mid-1990's (Markum and Harmata 1996). In 1991, total production of young golden eagles (2) and one adult female at Kevin Rim was lost due to electrocutions within one year. Banding and long-term radio-tracking will help determine if this trend is typical or aberrant and identify offending power lines/poles and other potentially manageable sources of mortality.

Since 1988, several studies incorporating raptor productivity monitoring have focused on the Kevin Rim area (Dubois 1988, Harmata 1991, VanHorn 1993, Zelenak 1996). Consequently a comprehensive data base, consistent in focus, effort, and methods has been compiled on short- and long-term reproductive performance of 6 species nesting in the vicinity of Kevin Rim over 7 years. Few other "Key Raptor Areas" have been monitored longer. This report maintains continuity in raptor population monitoring at Kevin Rim while contributing to a long term effort. The study incorporated key personnel involved in previous studies and included additional techniques for discerning certain aspects of population dynamics of key species, while incurring minimal additional effort, disruptive influence to the birds, or expense.

OBJECTIVES

A. Initiate application of techniques to determine additional aspects of population dynamics of key species (i.e. recruitment, homing, survival, adult turnover).

B. Monitor productivity[1] of 3 key raptor species nesting at or near Kevin Rim.

METHODS

Terminology used herein replaces "Territory" (Postupalsky 1974) with Breeding Area. "Known" raptor breeding areas indicate sites at which raptors displayed reproductive behavior (courtship, nest building, egg laying, production of young) at any time between 1988 and 1996 as recorded by Dubois (1988), Harmata (1991), VanHorn (1993), Zelenak (1996) and this study. Breeding areas are productive or unproductive, breeding pairs successful or unsuccessful.

A. Productivity monitoring:
Reproductive performance of raptors associated with Kevin Rim was determined and timed consistent with methods used by previous studies (Dubois 1988, Harmata 1991, VanHorn 1993, Zelenak 1996)

B. Population Dynamics:

[1] *See Postupalsky 1974 for definition of reproductive terminology*

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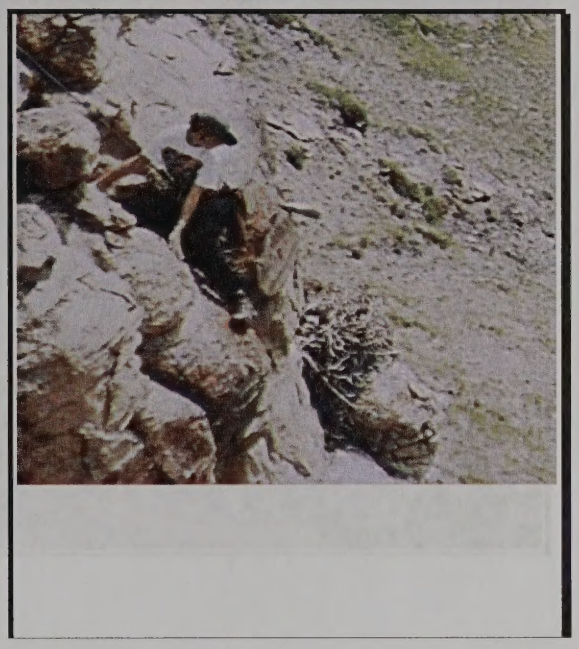
Productive raptor nests and eyries on cliffs were accessed by traditional rapelling techniques (Fig. 1). Use of an 3629 kg (8000 lb) vehicle winch saved time by allowing the bander to return to the top of the cliff immediately after banding at some sites. Prairie falcons, ferruginous hawks, and golden eagles were banded as nestlings with USFWS lock-on bands and blue and silver metal pop-rivet bands on the opposite leg (Figs. 2 & 3).

Emphasis for field work in 1996 was directed at colorbanding as many young of key species as possible, with priority assigned to ferruginous hawks and prairie falcons. Accordingly, field work was timed to insure that nestling hawks and falcons were of appropriate age for banding, while still allowing assessment of productivity of earlier nesting golden eagles.



RESULTS

The Kevin Rim area was visited between 25 and 27 June 1996 to investigate productivity and band nestling raptors. Approximately 80% of the study area covered by all researchers between 1988 to 1996 was inspected (Fig. 4). In this area, 33 ferruginous hawk, 11 prairie falcon and 3 golden eagle breeding areas were inspected. In addition, 4 known ferruginous hawk breeding areas to the southeast of the primary study area were inspected (Fig. 4). Seven ferruginous hawk breeding areas included in surveys from 1988 to 1994 were not checked (Fig. 4). One golden eagle breeding area also was not checked (Fig. 5).

Productivity

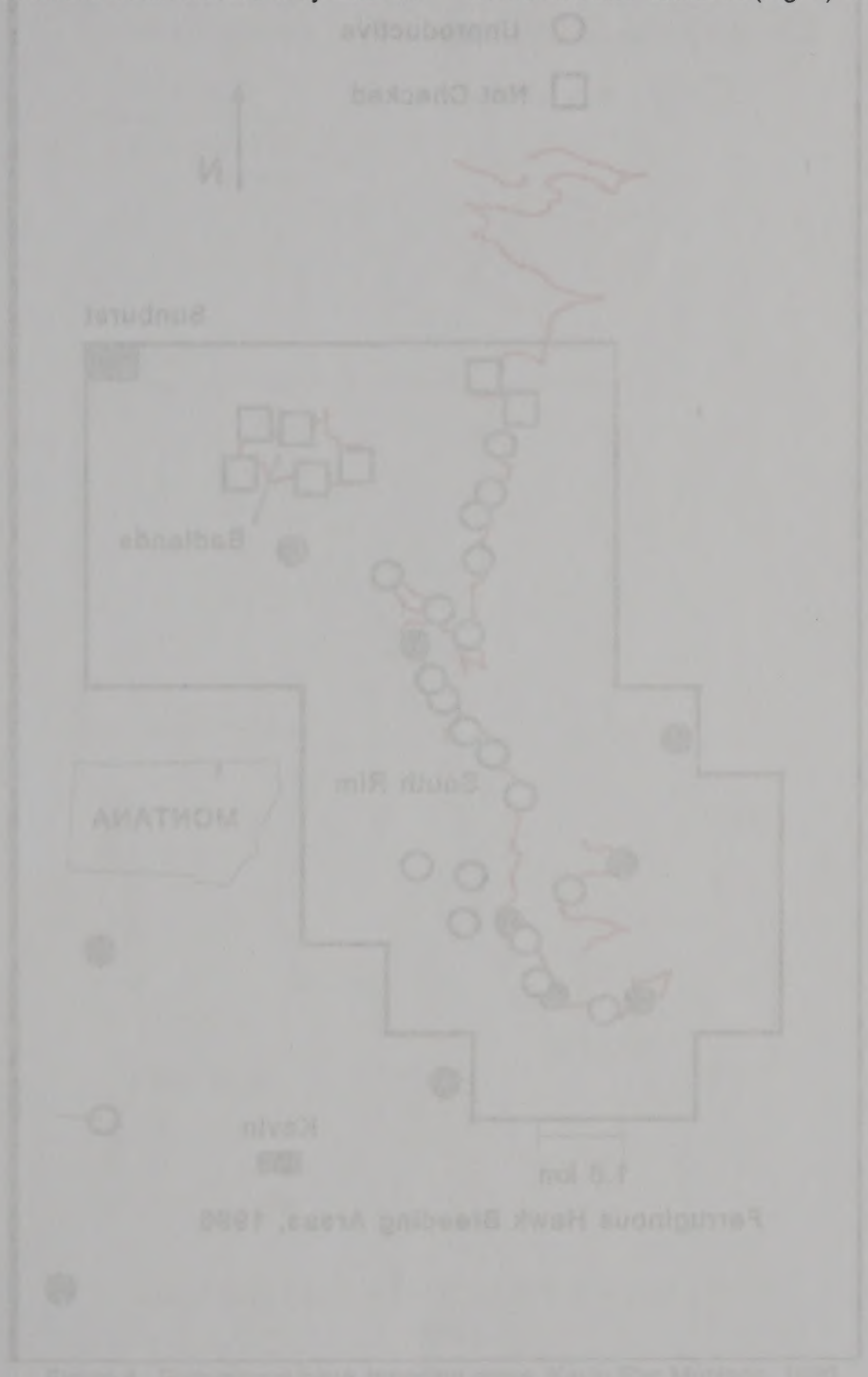
Timing and duration of field work, dictated by priorities and lack of funding, precluded complete recording of all productivity parameters. Neither occupancy nor activity was established for any species. Success of some prairie falcon pairs could not be determined. Time spent at some eyries was insufficient to locate adult falcons or gain an adequate view into eyries to detect nestlings ("u" sites, Fig. 5).

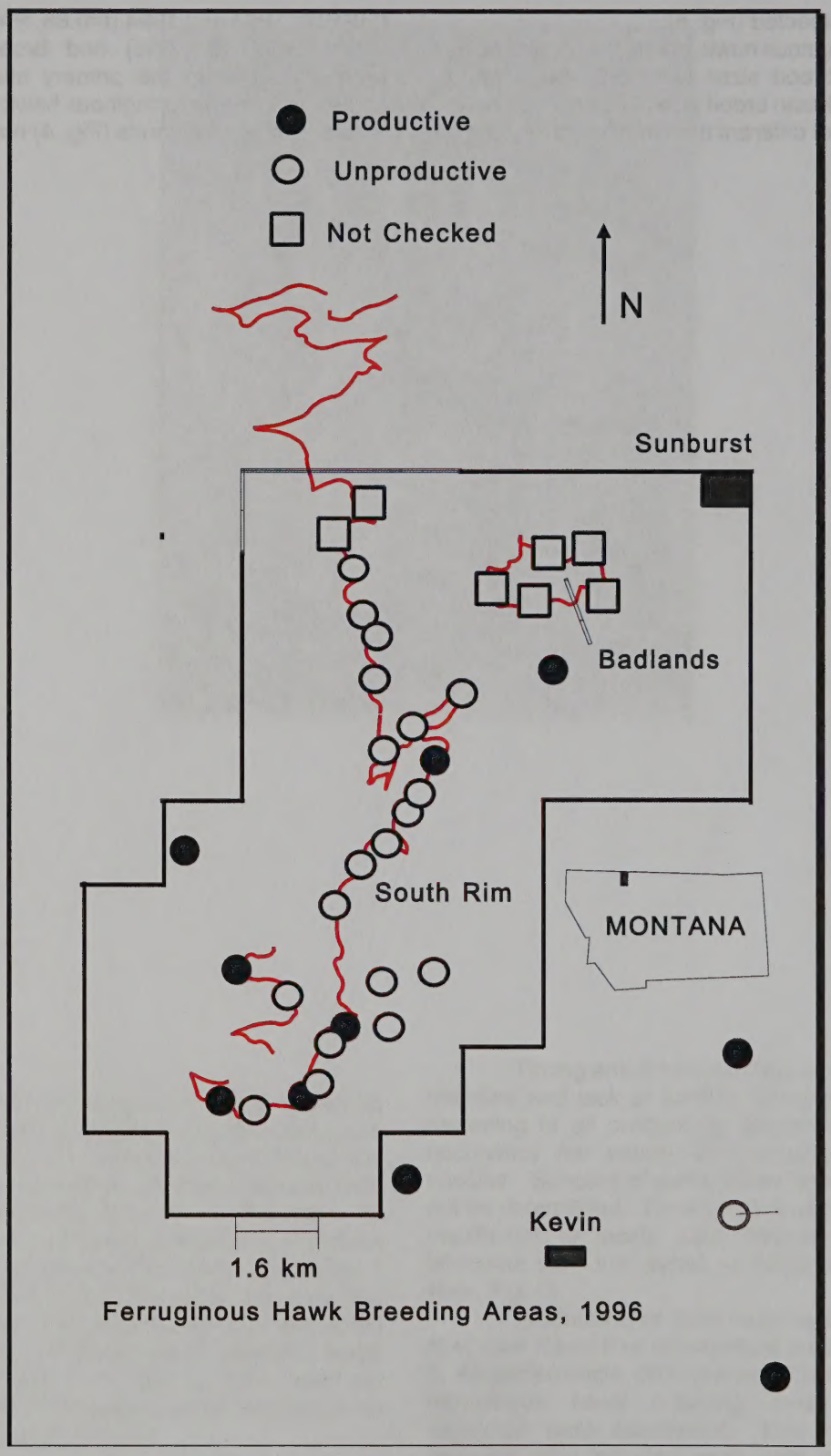
Productivity of 3 key raptor species breeding at or near Kevin Rim escarpment is shown in Table 1. All golden eagle, 50% of prairie falcon and 30% of ferruginous hawk breeding areas adequately inspected were successful. One golden eagle breeding area included nests both in and off the study area (>1.6km) but only one nest site was

adequately inspected (Fig. 5).

Ferruginous hawk, prairie falcon, and golden eagle mean brood sizes were 3.0, 4.0, and 1.0, respectively. Mean brood size of ferruginous hawks in 1996 was not different than that found by Zelenak (1996) in 1993 and 1994 ($t=0.88$, $P=0.382$).

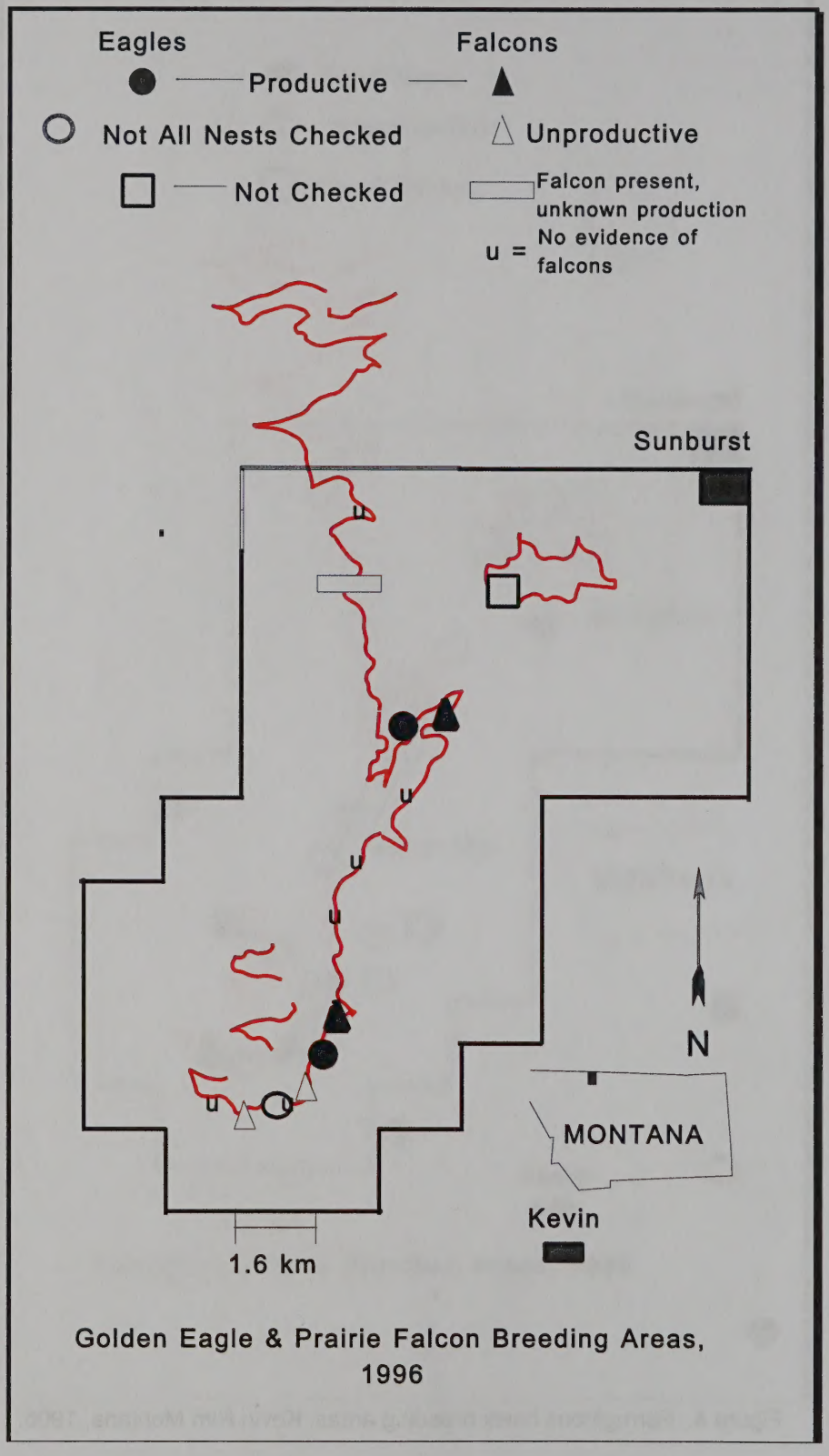
Success (27%) and brood size of 26 breeding areas in the primary study area were applied to 7 known ferruginous hawk breeding areas on the Rim and Badlands (Fig. 4) not inspected.





Ferruginous Hawk Breeding Areas, 1996

Figure 4. Ferruginous hawk breeding areas, Kevin Rim Montana, 1996.



Golden Eagle & Prairie Falcon Breeding Areas, 1996

Figure 5. Golden eagle and prairie falcon breeding areas, Kevin Rim Montana, 1996.

Table 1. Productivity of key raptor species, Kevin Rim, Montana, 1996.

Species	Breeding Areas		Young Produced	Young/Breeding Area (No. Areas)		
	Known	**Checked**		**Occupied**	**Active**	**Productive**
Ferruginous Hawk						
Study Area	28	26	23	-[1]	-[1]	3.28 (7)
Overall	40	30	30	-	-	3.0 (10)
Prairie Falcon	16	10[A]	8	2.0 (4)[3]	-[1]	4.0 (2)
Golden Eagle	4	2[4]	3	1.5 (2)	-[1]	1.5 (2)

[1]Late survey precluded determination.
[A] 6 not adequately inspected.
[2]Of those adequately inspected.
[3]One additional breeding area inspected but alternate nests were off study area and not inspected.

If the trend held true, 2 additional breeding areas may have been successful bringing total estimated number of successful ferruginous hawk breeding areas to 9 over the primary study area. Two additional successful breeding areas would have produced 6 or 7 young (Breeding areas x No. successful x average brood size, (7)(0.27)(3.28) = 6.6), bringing total estimated production of young hawks to a conservative 29.

Zelenak (1996) found 42% of occupied breeding areas were successful in 1993 and 1994. If applicable to 1996, estimated number of occupied breeding areas was 21. Including the 1996 estimate, number of young produced per occupied breeding area in the study area did not differ from expected among years (X^2=1.791, P=0.181, 6df).

Rim declined significantly between 1988 and 1994 (Fig. 6). However, inclusion of 1996 data resulted in an insignificant regression (Fig. 6). Eyas prairie falcons were severely infested with an avian tick (*Ornithodoras aquilae*). All looked debilitated (squinted eyes: Fig. 3) but acted normal.

Banding

A total of 33 raptors were banded (Table 2). One productive prairie falcon eyrie visited was inaccessible. One ferruginous hawk nest on the ground (Fig. 4) was not banded due to high potential of attracting predators to the site subsequent to banding. Nestling golden eagles were not banded in one nest due to advanced age. Entering the nest would have induced fledging of at least one of the nestlings.

Ferruginous hawk productivity at Kevin

Table 2. Species, number, colorband configuration and leg of raptors banded at Kevin Rim, Toole Co., Montana, summer 1996.

Species	Number Colorbanded	Colorband Configuration (Leg)
Ferruginous Hawk	**25[1]**	**Silver over Blue (L)**
Prairie Falcon	**5**	**Silver over Blue (L)**
Golden Eagle	**1**	**Silver over Blue (L)**

Species	Number Colorbanded	Colorband Configuration (Leg)
Total	33	

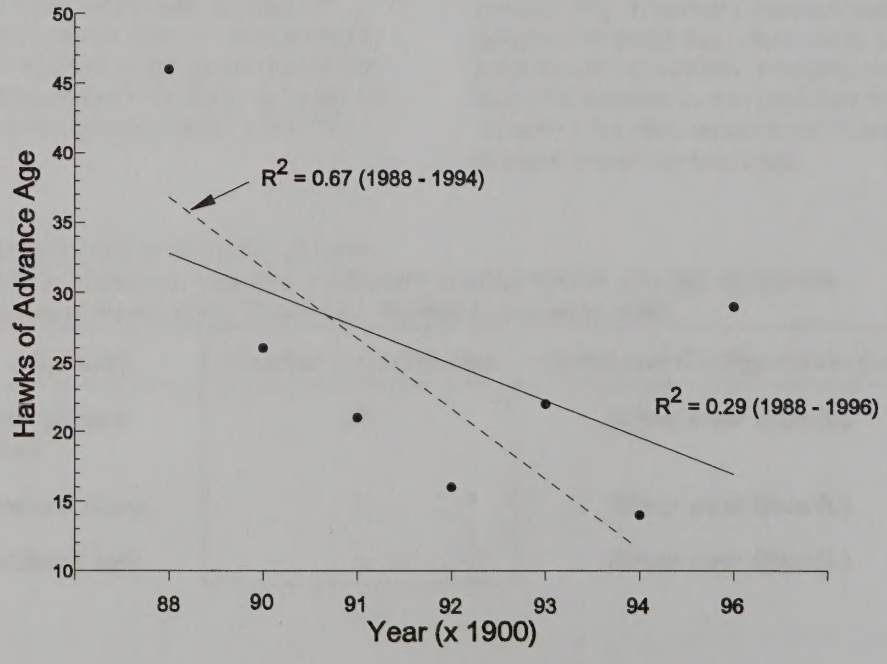
[1]Total of 27 banded with USFWS bands (ran out of colorbands).

DISCUSSION

Comparison of 1988-1994 ferruginous hawk productivity data with 1996 may not be appropriate. Number of ferruginous hawk young recorded in the Kevin Rim area in 1996 (30) was higher than all previous years except 1988, despite an incomplete survey. However, 4 breeding areas external to 1988-1994 study areas were included in 1996, representing 40% of productive breeding areas discovered, contributing 23% of young ferruginous hawks recorded. These breeding areas may have been historically better producers and, if included in surveys of previous years, overall productivity may have been similar. Accordingly productivity was evaluated separately (Table 1).

Productivity of ferruginous hawks declined from 1988 to 1994 (Fig. 6) but although superficially dramatic, number of young produced per occupied breeding areas was not statistically different among years. Also, number of young produced in 1996 increased from the trend and may indicate the beginning of an upswing in productivity. A multitude of factors may have been responsible for the decline in ferruginous hawk production between 1988 and 1994, but the potential impact of observer/researcher disturbance should not be ignored. Surveys began in 1988 and banding and capture activities occurred between 1990 and 1992. Intensive surveys continued through 1994. The dramatic increase in productivity in 1996 followed a year when no surveys or other intensive research were conducted due to extended inclement weather during optimal survey periods. The respite from observer scrutiny may have re-established tenacity of hawks to breeding areas and facilitated production.

Prairie falcon and golden eagle production could not be adequately evaluated due to small sample size, but appeared normal at least to mid-nestling stage. However, tick infestation of eyas prairie falcons may reduce fledging success. Tick induced mortality of prairie falcons usually occurs early in the nestling phase, generally before banding, but may occur later (Harmata pers. obs.). Determining productivity of falcons by number of young of advanced age present during banding may result in overestimates of overall productivity during cycles of tick infestations. *O. aquilae* also infest golden eagles but mortality is rare.



1997 PLANS & RECOMMENDATIONS

Limited funds dictated priorities and frugality, resulting in minimizing field activities to maximize efficiency in order to insure some funds were available to maintain continuity in effort to the year 2000 (5 yr. colorbanding originally proposed). Small budget was consumed with colorband cost, mileage, per diem, and equipment in 1996. **NO** salaries were paid! Larger expenditures are expected during 1997-2000. Emphasis on colorbanding and subsequent time required to determine band status on breeding pairs will exhaust the existing balance by the end of the 1997 field season. Determining occupancy and activity of key raptor species will require additional funding.

Funds currently available will allow a maximum 4 day field effort in 1997. In addition to banding all possible young within time constraints, attempts will be made to obtain production of at least ferruginous hawks. Dusting all nest sites and eyries with Sevin™ during banding may increase numbers of young fledged, especially prairie falcons.

To maximize data return, additional funding is recommended. A full time field tech would visit the Kevin Rim area in late March-early April for 1 week to record occupancy of key raptor breeding areas and determine band status of resident adults. He would return in early May to record activity and continue to investigate band status of adults. In late June, a 3 member field team will return to record productivity, band nestlings, and continue to investigate band status of adults. All visits will require per diem and mileage. One field tech will require a salary ($1300/mo. for 1½ mos.). $30,000 would cover field effort until the millennia.

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Direct communication to:
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Michelle:

Enclosed is the 1996 progress report for work done at Kevin Rim. Ferrug production was pretty good but we found some bugs on prairies that may affect/have affected long term productivity. Please note 1997 Plans and Recommendation section (pg. 8).

Of course more $$ are needed. We can stretch the budget to 2000 by just banding and devoting effort as in 1996. However, if we (you) want to determine band status of returning adults (the whole objective of current study), more effort (i.e., bucks) is needed. Let me know. Should I send a copy to Hinckley or will you?

Regards,

Alan R. Harmata, Ph.D.
406-586-3747

NOTE:

NO RESPONSE OR ACKNOWLEDGEMENT TO LETTER OR REPORT RECEIVED